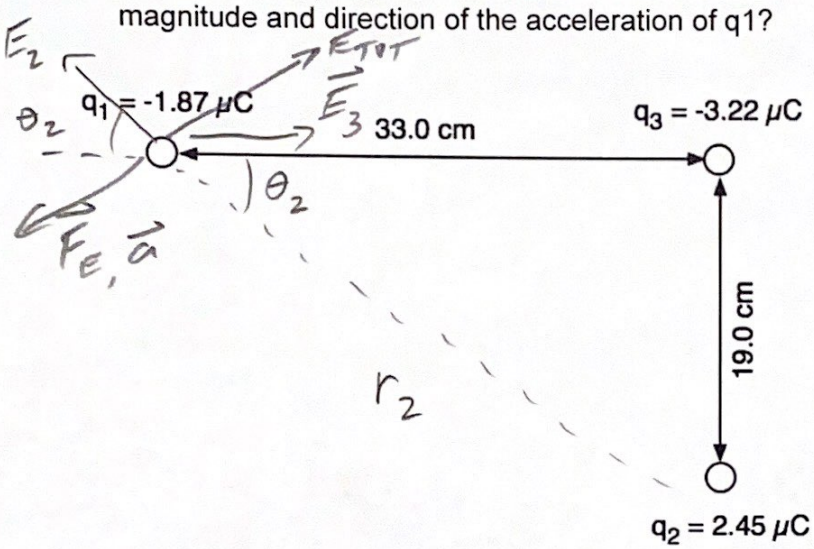
Quiz 18.1F

Assume the three charges below are fixed in place.

a) Find the magnitude and direction of the electric field (due to charges q2 and q3) in which charge q1 is immersed.

b) Assume now q1 is free to move and has a mass of 37.0 grams. What is the magnitude and direction of the acceleration of q1?



$r_2 = \sqrt{19^2 + 33^2} = 38.1\ cm$

$\theta_2 = \tan^{-1}\left(\frac{19}{33}\right) = 29.9°$

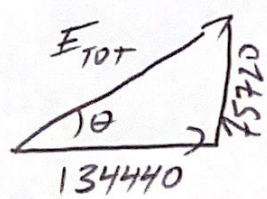
$|E_3| = \frac{(9\times10^9)(3.22\times10^{-6})}{.33^2} = 266120$, +x dir

$|E_2| = \frac{(9\times10^9)(2.45\times10^{-6})}{.381^2} = 151900$, 29.9° above −x

$E_{3x} = 266120$ $\quad E_{3y} = 0$

$E_{2x} = -131680$ $\quad E_{2y} = +75720$

134440 $\quad$ 75720



$|E_{TOT}| = \sqrt{134440^2 + 75720^2} = \boxed{154{,}000\ \frac{N}{C}}$

$\theta = \tan^{-1}\left(\frac{75720}{134440}\right) = \boxed{29.4°\ \text{above } +x}$

← Since q_1 negative, a F_E will point opposite of $\vec{E}$

b) $a = \left|\frac{q_1 E}{m}\right| = \frac{(1.87\times10^{-6})(154000)}{.037}$

$= \boxed{7.78\ m/s^2,\ 29.4°\ \text{below } -x}$